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**PATENT ABSTRACTS OF JAPAN**

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(71)Applicant : SEIKO INSTRUMENTS INC

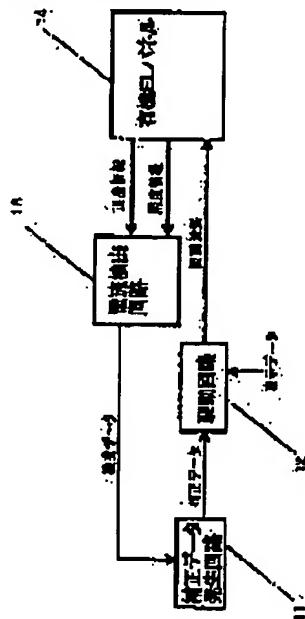
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**(54) ORGANIC EL DISPLAY DEVICE AND ORGANIC EL ELEMENT DRIVING METHOD****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide an organic EL device having a compact size and a light weight, capable of display and eliminating the use of extra power, without using an external sensor.

**SOLUTION:** The intensity of a light radiated to an organic EL panel 14 and the temperature of the organic EL panel 14 are measured by measuring a current value with a given voltage impressed on an organic EL element. The emission brightness of the organic EL panel 14 is adjusted to an optimum in a driving circuit 12 in accordance with obtained information. Thus, the organic EL panel 14 has bright emission in a bright area without using an external sensor and emission such that it is not dazzling in a dark area to provide easy-to-see and beautiful display.

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The organic electroluminescence display characterized by having the display-element organic EL device which displays information, and an organic EL device for measurement for measuring temperature or an illuminance.

[Claim 2] The organic electroluminescence display according to claim 1 characterized by equipping said organic EL device for measurement with the organic EL device for thermometries for measuring temperature, and the organic EL device for illumination photometry for measuring an illuminance according to an individual.

[Claim 3] The organic electroluminescence display according to claim 1 or 2 characterized by forming said display display-element organic EL device and said organic EL device for measurement in the same organic EL panel.

[Claim 4] The organic electroluminescence display for measurement according to claim 2 characterized by said organic EL device for thermometries and said organic EL device for illumination photometry being the same area.

[Claim 5] The organic electroluminescence display according to claim 2 characterized by being shaded with the case with which said organic EL device for illumination photometry incorporates said display-element organic EL device.

[Claim 6] The organic electroluminescence display characterized by having the display-element organic EL device which displays information, the organic EL device for measurement for measuring temperature or an illuminance, the amendment data generating circuit which creates amendment data based on the measurement result of said organic EL device for measurement, and the drive circuit which impresses the drive wave according to said amendment data and indicative data to said display-element organic EL device.

[Claim 7] The drive approach of the organic EL device characterized by measuring the optical reinforcement currently irradiated by said organic EL device by applying an electrical potential difference to the organic EL device in the condition that light is irradiated, and measuring a current value, and amending the luminescence reinforcement of said organic EL device based on said measurement result.

[Claim 8] The drive approach of the organic EL device characterized by measuring the optical reinforcement currently irradiated by said organic EL device by applying an electrical potential difference to the organic EL device in the condition that light is irradiated, and measuring a current value, and amending the luminescence reinforcement of the organic EL device for a display based on said measurement result.

[Claim 9] The drive approach of the organic EL device characterized by measuring the temperature of said organic EL device and amending the luminescence reinforcement of said organic EL device based on said measurement result by shading an organic EL device, applying an electrical potential difference to the organic EL device in the condition that outdoor daylight is not irradiated, and measuring a current value.

[Claim 10] The drive approach of the organic EL device characterized by measuring the temperature of said organic EL device and amending the luminescence reinforcement of the organic EL device for a display based on said measurement result by shading an organic EL

device, applying an electrical potential difference to the organic EL device in the condition that outdoor daylight is not irradiated, and measuring a current value.

[Claim 11] The drive approach of an organic EL device given in any 1 term of claims 7-10 characterized by said electrical potential difference applied to said organic EL device being a reverse bias.

[Claim 12] The drive approach of the organic EL device characterized by amending the luminescence reinforcement of said organic EL device by making into optical reinforcement the difference of the current value which applied and measured the electrical potential difference to the organic EL device in the condition that light is irradiated, and the current value which applied and measured the electrical potential difference to said organic EL device in the condition that outdoor daylight is not irradiated.

[Claim 13] The drive approach of the organic EL device characterized by amending the luminescence reinforcement of the organic EL device for a display by making into optical reinforcement the difference of the current value which applied and measured the electrical potential difference to the organic EL device for illumination photometry in the condition that light is irradiated, and the current value which applied and measured the electrical potential difference to the organic EL device for thermometries in the condition that outdoor daylight is not irradiated.

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]** This invention changes the luminescence reinforcement of a display element according to the external environment on which an organic EL panel is put about the drive approach of the organic electroluminescence display which has an organic EL device, and an organic EL device, and relates to the amendment circuit for displaying by the always optimal luminescence reinforcement.

**[0002]**

**[Description of the Prior Art]** The block diagram of the conventional organic EL device drive approach is shown in drawing 5. Moreover, drawing 6 is the top view showing the appearance of the conventional organic electroluminescence display module. The illuminance information on external is supplied to a detector 53 from temperature information and the illuminance sensor 52 from the thermo sensor 51 of drawing 5, and the temperature information and illuminance information which are sent analogically are changed into digital data, and it is sent to the amendment data generating circuit 54 in a detector 53. In the amendment data generating circuit 54, data processing for which it opted beforehand from the property of detection data and an organic EL device determines luminescence brightness, and the drive circuit 55 is supplied as amendment data. From amendment data and an indicative data, the drive circuit 55 generates a drive wave and impresses it to an organic EL panel 56. **[0003]** As shown in drawing 6, in the former, an organic EL panel 62 is prepared independently and the thermo sensor 64 and the photosensor 65 are installed in the organic electroluminescence display module 61. A photodiode, a photo transistor, etc. are used for illuminance sensors, such as a thermistor and a thermocouple, at a thermo sensor 64. Moreover, a detector 53, the amendment data generating circuit 54, and the drive circuit 55 are established in the tooth back of the organic electroluminescence display module 61.

**[0004]** An organic EL panel 56 emits light by the brightness amended with temperature and an external illuminance, can emit light brightly and can make extent which is not dazzling emit light in a dark location by the above configurations in a bright location.

**[0005]**

**[Problem(s) to be Solved by the Invention]** When using a luminescence display panel as a drop, it changes also by the same luminescence brightness with environments to be used, and is visible. In strong outdoor daylight, such as sunlight, luminescence brightness can be raised and a beautiful legible indication can be given by lowering luminescence brightness in dark rooms, such as a dark room. Moreover, in the drop of pocket devices, such as a wrist watch, small and low power are required and it is not necessary to use excessive power by making it moderate luminescence brightness according to the environment to be used for a cell drive. Therefore, by a conventional configuration and a conventional approach, the illuminance sensor 65 and the thermo sensor 64 were formed independently [ an organic EL panel 62 or the drive circuit 55 ]. Therefore, the organic electroluminescence display module 61 becomes large, and will become expensive. There was a problem that an error might arise since the sensor is placed apart from the organic EL panel again.

[0006]

[Means for Solving the Problem] In the drive approach of the organic EL device of this invention, the optical reinforcement currently irradiated by the organic EL panel and the temperature of an organic EL panel are measured by measuring the current value when applying a fixed electrical potential difference to an organic EL device as a means to solve the above-mentioned technical problem. In a drive circuit, the luminescence brightness of an organic EL panel is adjusted the optimal based on the information acquired here. A beautiful legible indication can be given also in the environment where illuminances differ by this, without using an external sensor. [0007]

[Embodiment of the Invention] Below, the gestalt of implementation of the drive approach of the organic electroluminescence display by this invention and an organic EL device is explained. That is, it was presupposed to the organic electroluminescence display by this invention that it has the display-element organic EL device which displays information, and an organic EL device for measurement for measuring temperature or an illuminance. And it becomes possible to adjust luminescence brightness according to a surrounding environment by amending the luminescence reinforcement of an organic electroluminescence display based on the temperature or the illuminance which the organic EL device for measurement measured.

[0008] Here, if both the organic EL devices for illumination photometry for measuring the organic EL device for thermometries and illuminance for measuring temperature as an organic EL device for measurement are carried and the luminescence reinforcement of an organic electroluminescence display is amended as in

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**TECHNICAL FIELD**

---

[Field of the Invention] This invention changes the luminescence reinforcement of a display element according to the external environment on which an organic EL panel is put about the drive approach of the organic electroluminescence display which has an organic EL device, and an organic EL device, and relates to the amendment circuit for displaying by the always optimal luminescence reinforcement.

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**PRIOR ART.**

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] By using the organic EL device drive approach of this invention, it can be made to display by the luminescence brightness doubled with the external environment, without using an external sensor, and small and the organic electroluminescence display module in which a lightweight and legible display is possible can be offered. For this reason, the effectiveness by being able to raise the completeness as a product, if it uses for the product with which small and low power low-cost fashionability, such as a wrist watch, are demanded, and using this invention is large.

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**TECHNICAL PROBLEM**

---

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**MEANS**

[Means for Solving the Problem] In the drive approach of the organic EL device of this invention, the optical reinforcement currently irradiated by the organic EL panel and the temperature of an organic EL panel are measured by measuring the current value when applying a fixed electrical potential difference to an organic EL device as a means to solve the above-mentioned technical problem. In a drive circuit, the luminescence brightness of an organic EL panel is adjusted the optimal based on the information acquired here. A beautiful legible indication can be given also in the environment where illuminances differ by this, without using an external sensor. [0007]

[Embodiment of the Invention] Below, the gestalt of implementation of the drive approach of the organic electroluminescence display by this invention and an organic EL device is explained. That is, it was presupposed to the organic electroluminescence display by this invention that it has the display-element organic EL device which displays information, and an organic EL device for measurement for measuring temperature or an illuminance. And it becomes possible to adjust luminescence brightness according to a surrounding environment by amending the luminescence reinforcement of an organic electroluminescence display based on the temperature or the illuminance which the organic EL device for measurement measured.

[0008] Here, if both the organic EL devices for illumination photometry for measuring the organic EL device for thermometries and illuminance for measuring temperature as an organic EL device for measurement are carried and the luminescence reinforcement of an organic electroluminescence display is amended as mentioned above, it will become possible to display the optimal brightness in a surrounding environment (temperature, brightness). Moreover, the organic EL device and the organic EL device for measurement which are used for a display can also be formed in the same organic EL panel.

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### EXAMPLE

[Example] The block diagram of the drive approach of the organic EL device of this invention is shown in drawing 1. The current detector 13 tells temperature information and illuminance information to the reception amendment data generating circuit 11 by measuring the current value when applying a fixed electrical potential difference to the organic EL device the temperature prepared in the organic EL panel 14, and for illumination photometry.

[0010] The amendment data generating circuit 11 transmits amendment data to the drive circuit 12 from the relation between the data obtained from the current detector 13, the illuminance set up beforehand, and luminescence brightness. The drive circuit 12 is made to emit light by the optimal brightness suitable for an external environment by generating a drive wave and being impressed by the organic EL panel 14 from amendment data and an indicative data. 5V are impressed to an organic EL device by the reverse bias, and the result of having measured the current value is shown in Table 1. [0011]

[Table 1]

有機EL素子面積 2 mm<sup>2</sup>

室温 25°C

照度 (1x)	電流値 (μA)
320	3.0
2500	3.5

[0012] The top view of the organic EL panel 21 in connection with this invention is shown in drawing 2. 7 segment display element 22 of a comparatively big 8-character configuration is formed in left-hand side, and double figures 7 segment display element of 4 figures and a comparatively small 8-character configuration is prepared in right-hand side at the organic EL panel 21. It is the luminescence display panel for a clock display which displays the time of time of day by 4 figures of this left-hand side, and displays a second by the double figures of right-hand side. Moreover, it is prepared in the location where EL element 23 for illumination photometry abandons, and EL element 24 for thermometries is shaded by the outer frame of a case or a module inside in addition to 7 segment display-element 22. [0013] The circuit diagram which explains the example of the organic EL device drive approach of this invention to drawing 3 is shown. Switches 303 and 304 are attached in the terminal of EL element 302 for a display, and it changes to the condition of connecting with the condition of displaying by connecting between the drive circuit 309 and GND, Vcc, and the current detector 301, and measuring an illuminance. In this example, since it can measure on an about [ 5V ] high electrical potential difference, it is impressing by the reverse bias, but forward bias is sufficient as long as it is the electrical potential difference of extent which does not emit light. [0014] In the current detector 301, a switch 303 is connected to resistance 305 and a current value is measured by detecting the electrical potential difference of the both ends of resistance 305. Specifically it changes after magnification in the voltage amplification circuit 306, the electrical potential difference of the both ends of resistance 305 is changed into digital data by A/D converter 307, and it outputs as detection data. In the amendment data generating circuit 308, luminescence brightness is

determined from the relation between the data detected in the current detector 301, the illuminance beforehand prepared by ROM etc., and the optimal luminescence brightness of an organic EL device 302, and the amendment data is outputted to the drive circuit 309. [0015] A drive wave is made from amendment data and an indicative data, and EL element 302 for a display is made to emit light in the drive circuit 309. Moreover, while making light emit, a switch 303 is connected to the drive circuit 309, and the switch 304 is connected to GND. The synchronizing signal generating circuit 310 generated and supplies the synchronizing signal required for switches 303 and 304, A/D converter 307, the amendment data generating circuit 308, and the drive circuit 309.

[0016] Drawing 4 is a circuit diagram for explaining another example of the organic EL device drive approach of this invention. EL element 404 for illumination photometry and EL element 405 for thermometries are created by the organic EL panel 402 at the same process other than EL element 403 for a display, and EL element 405 for thermometries is created in the location shaded by the case or the outer frame. In the current detector 401, it connects with EL element 404 for illumination photometry, and EL element 405 for thermometries, and a switch 406 changes temperature and an illuminance, and can measure now. It is outputted as illuminance data with which the switch 406 was specifically first connected to EL element 404 for illumination photometry, and it changed after magnification in the voltage amplification circuit 408, it changed the electrical potential difference of the both ends of resistance 407 into the digital data by A/D converter 409, and the temperature error was included. Next, it connects with EL element 405 for thermometries, and a switch 406 carries out same measurement, and is outputted as temperature data.

[0017] In the amendment data generating circuit 410, from the illuminance data detected in the current detector 401, temperature data are lengthened, it considers as illuminance data, the optimal luminescence brightness is determined, and the amendment data is outputted to the drive circuit 410. The relation between an illuminance, the optimal luminescence brightness and temperature, and luminescence brightness is beforehand prepared by ROM etc. like a precedent. A drive wave is made from amendment data and an indicative data, and EL element 403 for a display is made to emit light in the drive circuit 410. The synchronizing signal generating circuit 412 generated and supplies the synchronizing signal required for a switch 406, A/D converter 409, the amendment data generating circuit 410, and the drive circuit 411.

[0018] The approach except inserting resistance as the amperometry approach and measuring an electrical potential difference here may be used. Moreover, A/D, an amendment data generating circuit, and a drive circuit may be analogically processed besides processing in digital one.

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] The block diagram of the organic EL device drive approach of this invention

[Drawing 2] The top view of the organic EL panel driven by the organic EL device drive approach of drawing 1

[Drawing 3] The circuit diagram for explaining the organic EL device drive approach of this invention

[Drawing 4] The circuit diagram for explaining the another organic EL device drive approach of this invention

[Drawing 5] The block diagram showing the conventional example

[Drawing 6] The top view of the organic electroluminescence display module in which the conventional example is shown

**[Description of Notations]**

11, 308, 410, 54 Amendment data generating circuit

12, 309, 411, 55 Drive circuit

13, 301, 401 Current detector

14, 21, 402, 56, 62 Organic EL panel

22, 302, 403, 63 EL element for a display

23, 404 EL element for illumination photometry

24, 405 EL element for thermometries

303, 304, 406 Switch

305 407 Resistance

306 408 Voltage amplification circuit

307 409 A/D converter

310 412 Synchronizing signal generating circuit

311 413 CPU

51 64 Thermo sensor

52 65 Illuminance sensor

53 Detector

61 Organic Electroluminescence Display Module

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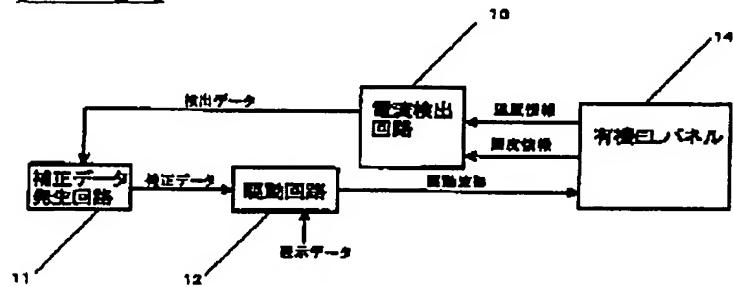
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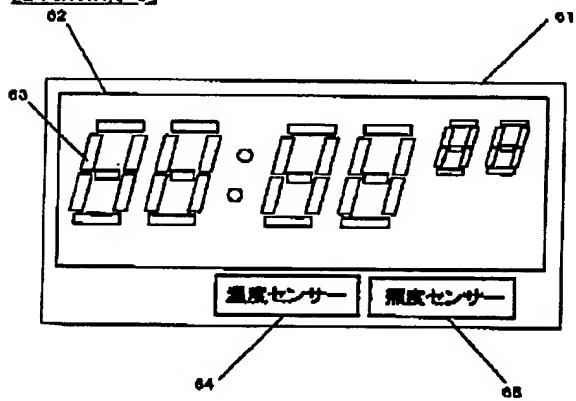
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DRAWINGS

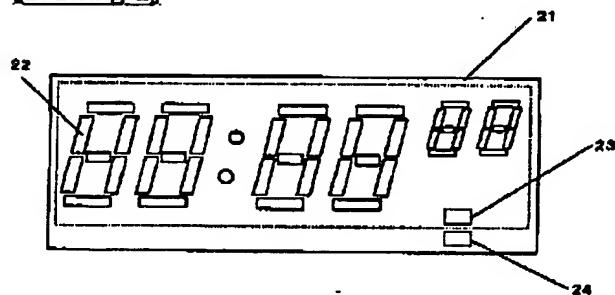
[Drawing 1]



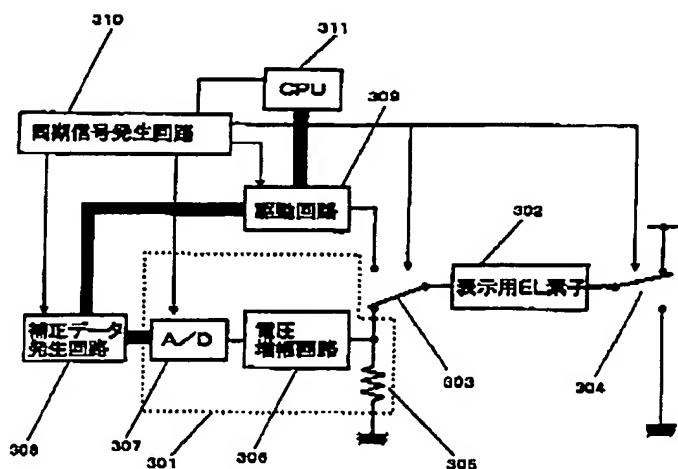
[Drawing 6]



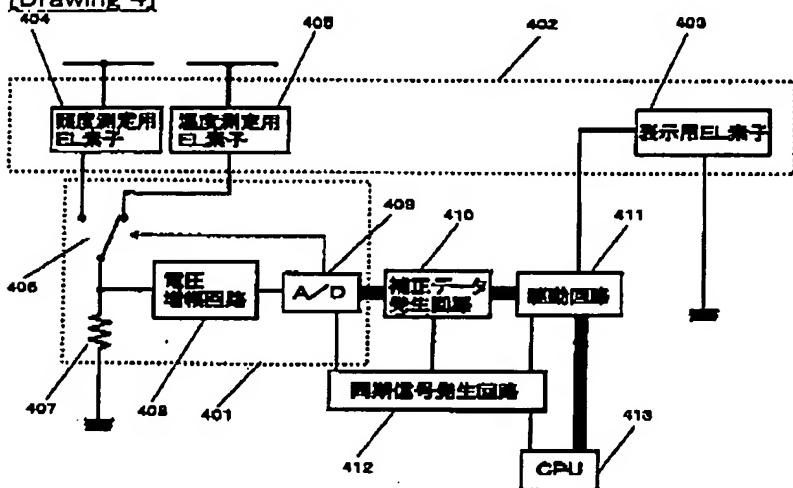
[Drawing 2]



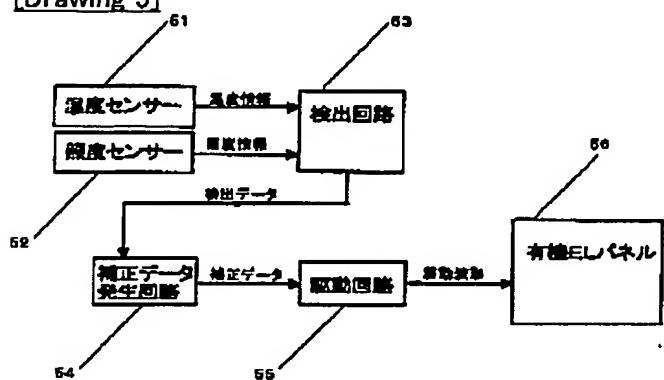
[Drawing 3]



[Drawing 4]



[Drawing 5]



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審査請求 未請求 請求項の数13 O.L (全 6 頁)

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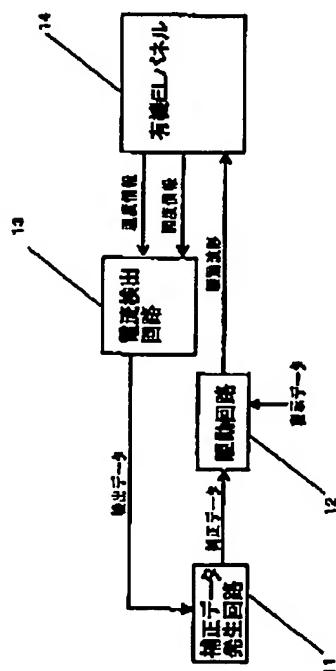
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(54)【発明の名称】 有機EL表示装置、及び、有機EL素子の駆動方法

(57)【要約】

【課題】 発光表示パネルを用いて表示する場合、同じ発光輝度でも使用する環境により異なって見える問題があるが、これを外付けセンサーを用いずに解決させ、小型、軽量で見やすい表示が可能で余分な電力を使わない有機EL装置を実現させる。

【解決手段】 有機EL素子に一定の電圧を加えたときの電流値を測定することにより有機ELパネルに照射されている光強度および有機ELパネルの温度を測定する。ここで得られた情報を元に駆動回路において有機ELパネルの発光輝度を最適に調整し、外部センサーを使わずに明るい場所では明るく発光して、暗い場所では暗くない程度に発光させ見やすく奇麗な表示状態を実現する。



## 【特許請求の範囲】

【請求項1】 情報を表示する表示要素有機EL素子と、温度または照度を測定するための測定用有機EL素子と、を備えることを特徴とする有機EL表示装置。

【請求項2】 前記測定用有機EL素子が、温度を測定するための温度測定用有機EL素子と、照度を測定するための照度測定用有機EL素子と、を個別に備えることを特徴とする請求項1に記載の有機EL表示装置。

【請求項3】 前記表示表示要素有機EL素子と前記測定用有機EL素子が同一の有機ELパネルに設けられたことを特徴とする請求項1または2に記載の有機EL表示装置。

【請求項4】 前記温度測定用有機EL素子と前記照度測定用有機EL素子が同一の面積であることを特徴とする請求項2に記載の測定用の有機EL表示装置。

【請求項5】 前記照度測定用有機EL素子が前記表示要素有機EL素子を組み込む筐体により遮光されていることを特徴とする請求項2記載の有機EL表示装置。

【請求項6】 情報を表示する表示要素有機EL素子と、温度または照度を測定するための測定用有機EL素子と、前記測定用有機EL素子の測定結果に基づいて補正データを作成する補正データ発生回路と、前記補正データと表示データに応じた駆動波形を前記表示要素有機EL素子に印加する駆動回路と、を備えることを特徴とする有機EL表示装置。

【請求項7】 光が照射されている状態の有機EL素子に電圧を加えて電流値を測定することにより前記有機EL素子に照射されている光強度を測定し、前記測定結果に基づいて前記有機EL素子の発光強度を補正することを特徴とする有機EL素子の駆動方法。

【請求項8】 光が照射されている状態の有機EL素子に電圧を加えて電流値を測定することにより前記有機EL素子に照射されている光強度を測定し、前記測定結果に基づいて表示用有機EL素子の発光強度を補正することを特徴とする有機EL素子の駆動方法。

【請求項9】 有機EL素子を遮光して外光が照射されていない状態の有機EL素子に電圧を加えて電流値を測定することにより前記有機EL素子の温度を測定し、前記測定結果に基づいて前記有機EL素子の発光強度を補正することを特徴とする有機EL素子の駆動方法。

【請求項10】 有機EL素子を遮光して外光が照射されていない状態の有機EL素子に電圧を加えて電流値を測定することにより前記有機EL素子の温度を測定し、前記測定結果に基づいて表示用有機EL素子の発光強度を補正することを特徴とする有機EL素子の駆動方法。

【請求項11】 前記有機EL素子に加える前記電圧が逆バイアスであることを特徴とする請求項7～10のいずれか1項に記載の有機EL素子の駆動方法。

【請求項12】 光が照射されている状態の有機EL素子に電圧を加えて測定した電流値と、外光が照射されて

いない状態の前記有機EL素子に電圧を加えて測定した電流値との差を光強度として前記有機EL素子の発光強度を補正することを特徴とする有機EL素子の駆動方法。

【請求項13】 光が照射されている状態の照度測定用有機EL素子に電圧を加えて測定した電流値と、外光が照射されていない状態の温度測定用有機EL素子に電圧を加えて測定した電流値との差を光強度として表示用有機EL素子の発光強度を補正することを特徴とする有機EL素子の駆動方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は有機EL素子を有する有機EL表示装置、及び有機EL素子の駆動方法に関するものであり、有機ELパネルの置かれる外部環境により表示エレメントの発光強度を変えて、常に最適な発光強度で表示するための補正回路に関するものである。

## 【0002】

【従来の技術】従来の有機EL素子駆動方法のブロック図を図5に示す。また、図6は従来の有機EL表示モジュールの外観を示す平面図である。図5の温度センサー51から温度情報、照度センサー52から外部の照度情報を検出回路53へ供給され、検出回路53ではアナログで送られてくる温度情報、照度情報をデジタルデータに変換して補正データ発生回路54へ送られる。補正データ発生回路54では、検出データと有機EL素子の特性から予め決められた演算処理により発光輝度を決定し補正データとして駆動回路55へ供給される。駆動回路55は補正データと表示データより駆動波形を発生し有機ELパネル56へ印加する。

【0003】図6に示すように、従来では温度センサー64と光センサー65が有機ELパネル62とは別に用意され、有機EL表示モジュール61内に設置されている。温度センサー64にはサーミスター、熱電対等、照度センサーにはフォトダイオード、フォトトランジスタ等が用いられる。また、検出回路53、補正データ発生回路54、駆動回路55は有機EL表示モジュール61の背面に置かれる。

【0004】以上のような構成により、有機ELパネル56は温度及び外部の照度で補正された輝度で発光し、明るい場所では明るく発光して、暗い場所では眩しくない程度に発光させることができる。

## 【0005】

【発明が解決しようとする課題】表示器として発光表示パネルを用いる場合、使用する環境により同じ発光輝度でも異なって見える。太陽光などの強い外光の中では発光輝度を上げ、暗室などの暗い部屋の中では発光輝度を下げることにより見やすく奇麗な表示をさせる事ができる。また、腕時計など携帯機器の表示器においては、電池駆動のため、小型・ローパワーが要求され、使用する

環境により適度な発光輝度にすることにより余分な電力を使わずにすむ。そのため、従来の構成及び方法では、照度センサー65、温度センサー64を有機ELパネル62や駆動回路55とは別に設けていた。そのため、有機EL表示モジュール61が大きくなってしまい高価なものとなってしまい、また、センサーが有機ELパネルと別に置かれているため誤差が生じる可能性がある、という問題があった。

## 【0006】

【課題を解決するための手段】本発明の有機EL素子の駆動方法においては、上記課題を解決する手段として有機EL素子に一定の電圧を加えたときの電流値を測定することにより有機ELパネルに照射されている光強度および有機ELパネルの温度を測定する。ここで得られた情報を元に駆動回路において有機ELパネルの発光輝度を最適に調整する。これにより、外部センサーを使わずに照度の異なる環境においても見やすく奇麗な表示をさせる事ができる。

## 【0007】

【発明の実施の形態】以下に、本発明による有機EL表示装置及び有機EL素子の駆動方法の実施の形態を説明する。すなわち、本発明による有機EL表示装置は、情報を表示する表示要素有機EL素子と、温度または照度を測定するための測定用有機EL素子と、を備えることとした。そして、測定用有機EL素子が測定した温度または照度に基づいて有機EL表示装置の発光強度を補正することにより、周囲の環境に応じて発光輝度を調整することが可能になる。

【0008】ここで、測定用有機EL素子として温度を測定するための温度測定用有機EL素子と照度を測定するための照度測定用有機EL素子とを共に搭載し、前述のように有機EL表示装置の発光強度を補正すれば、周囲の環境（温度、明るさ）における最適な輝度の表示を行うことが可能になる。また、表示に用いる有機EL素子と測定用有機EL素子を同一の有機ELパネル内に設けることもできる。

## 【0009】

【実施例】本発明の有機EL素子の駆動方法のブロック図を図1に示す。有機ELパネル14に設けられた温度及び照度測定用の有機EL素子に一定の電圧を加えたときの電流値を測定することにより温度情報及び照度情報を電流検出回路13は受け取り補正データ発生回路11に伝える。

【0010】補正データ発生回路11は電流検出回路13より得られたデータと予め設定された照度と発光輝度の関係から補正データを駆動回路12に伝える。駆動回路12は補正データと表示データより駆動波形を発生させ有機ELパネル14に印加することにより外部環境に合った最適な輝度で発光させる。有機EL素子に逆バイアスで5Vを印加して、電流値を測定した結果を表1に

示す。

## 【0011】

## 【表1】

有機EL素子面積 室温	$2 \text{ mm}^2$ $25^\circ\text{C}$
照度 (1x)	電流値 ( $\mu\text{A}$ )
320	3.0
2500	3.5

10 【0012】本発明に関わる有機ELパネル21の平面図を図2に示す。有機ELパネル21には、比較的大きな8字形状の7セグメント表示要素22が左側に4桁、比較的小さな8字形状の7セグメント表示要素が右側に2桁設けられている。この左側の4桁で時刻の時分を表示し、右側の2桁で秒の表示を行う時計表示用の発光表示パネルである。また、7セグメント表示要素22以外に照度測定用EL素子23が見切り内、温度測定用EL素子24が筐体またはモジュールの外枠で遮光される位置に設けられている。

20 【0013】図3に本発明の有機EL素子駆動方法の具体例を説明する回路図を示す。表示用EL素子302の端子にはスイッチ303、304が取り付けられ、駆動回路309とGND間に接続して表示を行う状態とVccと電流検出回路301に接続して照度を測定する状態に切り替えられる。本実施例では、5V程度の高い電圧で測定できるため逆バイアスで印加しているが、発光しない程度の電圧であれば順バイアスでも構わない。

【0014】電流検出回路301ではスイッチ303が抵抗305に接続され、抵抗305の両端の電圧を検出することにより電流値を測定する。具体的には抵抗305の両端の電圧を電圧増幅回路306で増幅後、A/Dコンバータ307でデジタルデータに変換して検出データとして出力する。補正データ発生回路308では電流検出回路301で検出されたデータと予めROM等で用意された照度と有機EL素子302の最適な発光輝度の関係から発光輝度を決定して、その補正データを駆動回路309に出力する。

【0015】駆動回路309では補正データと表示データから駆動波形を作り表示用EL素子302を発光させる。また発光させている間はスイッチ304が駆動回路309に接続されている。同期信号発生回路310は、スイッチ303、304、A/Dコンバータ307、補正データ発生回路308および駆動回路309に必要な同期信号を発生し供給している。

【0016】図4は本発明の有機EL素子駆動方法の別の具体例を説明するための回路図である。有機ELパネル402には表示用EL素子403の他に照度測定用EL素子404と温度測定用EL素子405が同一の工程で作成され、温度測定用EL素子405は筐体または

外枠等で遮光される位置に作成する、電流検出回路401ではスイッチ406が照度測定用EL素子404と温度測定用EL素子405に接続され、温度と照度を切り替えて測定できるようになっている。具体的には最初にスイッチ406が照度測定用EL素子404に接続され、抵抗407の両端の電圧を電圧增幅回路408で増幅後、A/Dコンバータ409でデジタルデータに変換して温度誤差が含まれた照度データとして出力される。次にスイッチ406が温度測定用EL素子405に接続され同様の測定をして温度データとして出力される。

【0017】補正データ発生回路410では電流検出回路401で検出された照度データより温度データを引いて照度データとし、最適な発光輝度を決定してその補正データを駆動回路410に出力する。照度と最適発光輝度、温度と発光輝度の関係は前例と同様に予めROM等で用意される。駆動回路410では補正データと表示データから駆動波形を作り表示用EL素子403を発光させる。同期信号発生回路412はスイッチ406、A/Dコンバータ409、補正データ発生回路410、駆動回路411に必要な同期信号を発生し供給している。

【0018】ここで、電流測定方法として抵抗を挿入して電圧を測定する以外の方法でもよい。また、A/D、補正データ発生回路、駆動回路はデジタルで処理する以外にアナログで処理しても構わない。

【0019】

【発明の効果】本発明の有機EL素子駆動方法を用いる事により、外付けセンサーを用いずに外部環境に合わせた発光輝度で表示させることができ、小型、軽量で見やすい表示が可能な有機EL表示モジュールを提供できる。このため、腕時計などの、小型・ローパワー・ロー

コスト・ファッショニ性が要求される製品に用いると製\*

【図面の簡単な説明】

【図1】本発明の有機EL素子駆動方法のブロック図

【図2】図1の有機EL素子駆動方法で駆動する有機ELパネルの平面図

【図3】本発明の有機EL素子駆動方法を説明するための回路図

【図4】本発明の別の有機EL素子駆動方法を説明するための回路図

【図5】従来例を示すブロック図

【図6】従来例を示す有機EL表示モジュールの平面図

【符号の説明】

11、308、410、54 補正データ発生回路

12、309、411、55 駆動回路

13、301、401 電流検出回路

14、21、402、56、62 有機ELパネル

22、302、403、63 表示用EL素子

23、404 照度測定用EL素子

24、405 温度測定用EL素子

303、304、406 スイッチ

305、407 抵抗

306、408 電圧増幅回路

307、409 A/Dコンバータ

310、412 同期信号発生回路

311、413 CPU

51、64 温度センサー

52、65 照度センサー

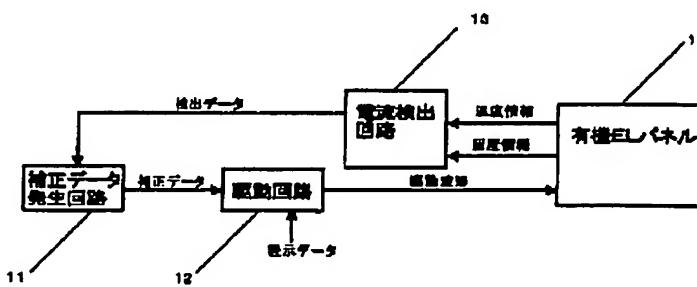
53 検出回路

61 有機EL表示モジュール

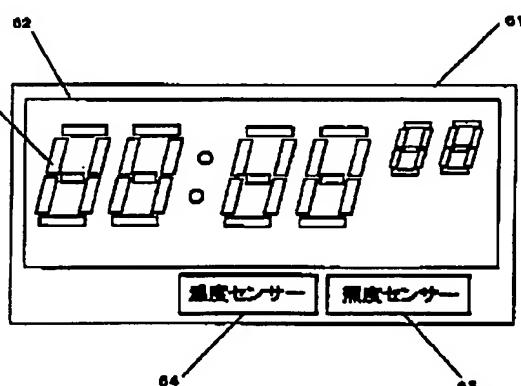
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コス

【図1】



【図6】

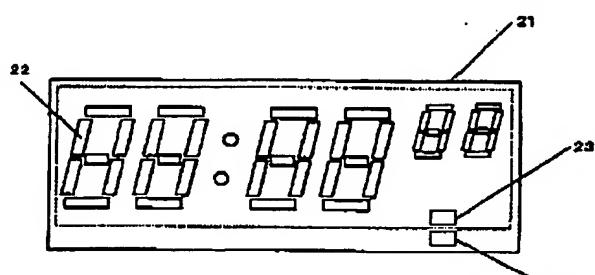


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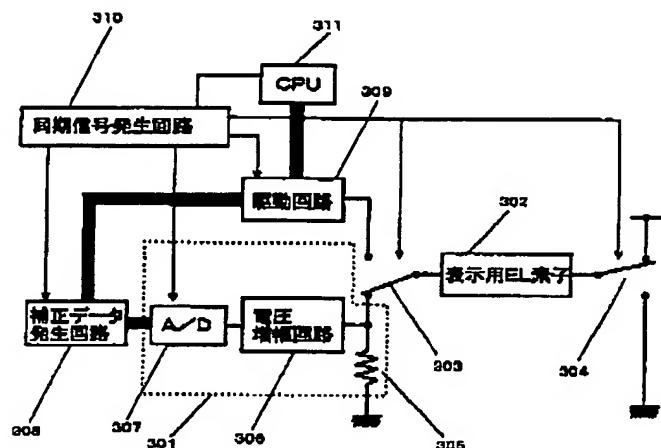
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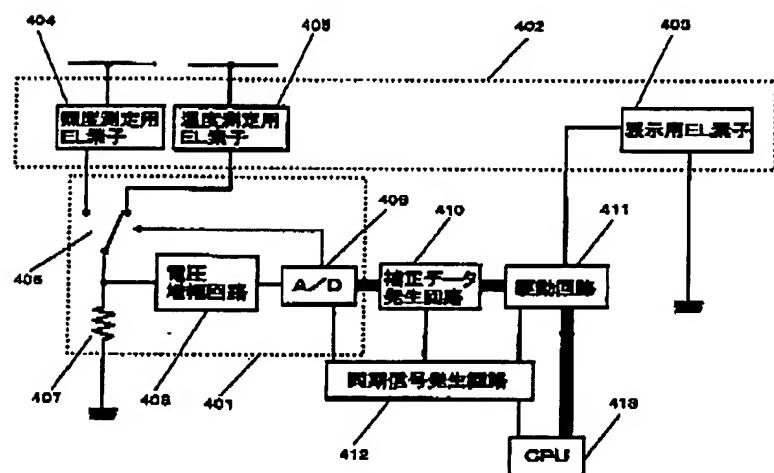
【図2】



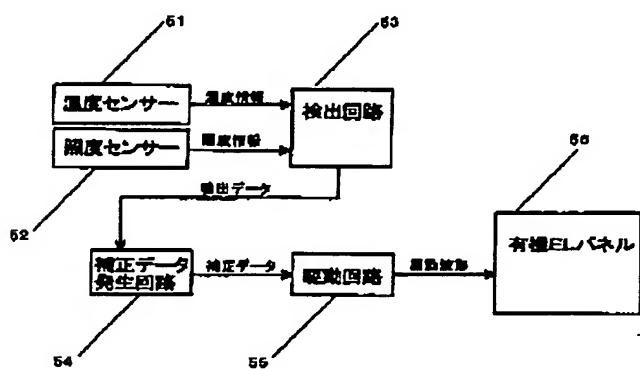
【図3】



【図4】



【図5】



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